

## **Yellowstone River Conservation District Council (YRCDC)**

### **City of Glendive I-94 Bypass Chute - Hydraulic Analysis Position Statement**

At its June 21, 2007 meeting, the YRCDC heard testimony and received a request from representatives from Dawson County and the City of Glendive to include, within the larger cumulative effects investigation, analysis of the effects of by-pass chute reestablishment on flood and ice jam hazards. At that same meeting, the YRCDC passed a motion to implement such a request, and this position statement is intended to articulate and document its intention.

#### **Position Statement:**

**The Yellowstone River Conservation District Council will support and participate in the efforts of the local, state, and federal entities (listed below) by agreeing to provide data and information collected for its ongoing Yellowstone River cumulative effects study (CES) that may be pertinent to a future investigation into the reestablishment of a secondary channel beneath the I-94 highway bridge approach.**

Participating Entities: **The City of Glendive, Dawson County, the U.S. Army Corps of Engineers, Dawson County Conservation District, the Montana Department of Transportation**

#### **Background**

Location: The City of Glendive is located in Dawson County in eastern Montana. The city is situated on the Yellowstone River approximately 91 miles upstream from its confluence with the Missouri River. The Yellowstone River flows from southwest to northeast through the city dividing it into Glendive proper and West Glendive. Glendive proper is located on the high, right bank bluff overlooking the Yellowstone River valley. West Glendive is located on the left bank floodplain and is protected from flooding by the West Glendive Levee.

Flood History: The City of Glendive is subject to flooding from ice jams on the Yellowstone River. Open water flood events have not been a problem since the construction of the West Glendive Levee. The city has experienced 30 ice jam floods since 1890 including major ice jam floods in 1899, 1936, 1969, 1986, and 1994. A total of 16 deaths have occurred from these flood events. The 1994 flood was due to the break-up of a major ice jam upstream from the community and the wave of water, debris, and ice rushing through the city. All other events were due to ice jam formation in the reach downstream from the current Interstate 94 Bridge. The 1969, 1986, and 1994 ice jam floods all came within 0.5- to 1.5-feet of overtopping the West Glendive Levee.

Development History: The Glendive reach of the Yellowstone River has been significantly modified beginning in the late 19<sup>th</sup> century. In 1902, the Northern Pacific Railroad (currently Burlington Northern-Santa Fe Railroad) constructed a nine span iron truss bridge over the Yellowstone River just upstream of the city (see location map). This bridge is commonly referred to as the “Black Bridge”. The elevation of the Black Bridge resulted in approach embankments as much as 10 feet above the floodplain on the left bank. These large embankments effectively prevent Yellowstone River flood flows from accessing a large

portion of the left bank floodplain and contain the naturally migrating channel to the bridge opening.

Two different Highway 10 bridges (one of which is now a pedestrian bridge) were later built downstream of the Black Bridge to connect West Glendive and Glendive. These two bridges, in combination with the construction of the West Glendive levee in 1959, further constrained the river to its current alignment. During the late 1960's, the Interstate 94 Bridge was constructed just downstream from the city at a height sufficient to tie into the right bank bluff line. The construction of a long, elevated road embankment across the left bank floodplain acts as a significant obstruction to flood flows by effectively blocking a large secondary channel (bypass chute).

### **Current Circumstances**

Section 206 Study: In March 2002, the U.S. Army Corps of Engineers produced a draft Floodplain Management Plan for the City of Glendive under the Section 206 Technical Assistance Program. The purpose of the plan was to investigate alternatives to reduce the occurrence and severity of flood hazards along the Yellowstone River in Glendive. The primary goal of the work was to plot a course of action for alleviating flood problems and mitigating structures built out of compliance with the National Flood Insurance Program.

A plan that included reestablishment of the bypass chute, removal of the West Glendive levee, and buyout of about 100 floodplain structures was selected as the recommended alternative based on maximization of net benefit (benefit/cost ratio). If implemented as proposed, the plan would construct two new 2-lane bridges on Interstate 94 where the chute used to pass under the Interstate. The reconnaissance-level study estimated the new I-94 bridges would need to be 275-feet long and would cost \$2.23 million. Combined with the levee removal and floodplain buy-out options, the total package was estimated to cost \$18 million and provide 100-year flood protection, as well as environmental and recreational benefits.

Cumulative Effects Investigation: More recent events include the entering of a cost-sharing agreement between the U.S. Army Corps of Engineers and the YRCDC in March 2004. This agreement contains a work plan that includes, among other elements of the cumulative effects investigation, the technical analyses necessary to prepare an updated Flood Insurance Rate Map (FIRM) for Dawson County and the City of Glendive. Currently, the Corps is preparing updated hydrology and conducting the hydraulic modeling necessary to estimate water surface elevations during a 100-year ice-affected flood event on the Yellowstone River in and around the City of Glendive. This investigation will also take into consideration the effects of Yellowstone Dam on the flooding and ice jamming along this reach. As part of the local cost-share contribution, the YRCDC and Dawson County have purchased the necessary high-accuracy LIDAR topographic mapping needed to conduct the detailed hydraulic analysis.